

WHAT IS CLAIMED IS:

1. A current measurement apparatus of current that flows in a transmission line of an electric circuit, comprising:

5 a light source that radiates polarized light;
a magneto-optical device which is installed in a magnetic field generated based upon current that flows in the transmission line, applies the variation of polarization proportional to magnetization induced by
10 the magnetic field to the polarized light when the polarized light radiated from the light source is incident and reflects the polarized light; and
means for converting the variation of polarization included in the polarized light reflected
15 on the magneto-optical device to an electric signal and measuring current.

2. A current measurement apparatus according to Claim 1, further comprising:

20 a magnetic field generator for applying a magnetic field to the magneto-optical device.

3. A current measurement apparatus according to Claim 1, wherein:

25 the direction of the magnetization and a direction in which the polarized light travels in an incident position of the polarized light are parallel.

4. A current measurement apparatus according to Claim 1, wherein:

the light source is a pulse laser; and

the pulse laser is oscillated in
synchronization with measured current.

5. A current measurement apparatus according to
Claim 1, wherein:

5 the magneto-optical device is made of a bismuth
substituted yttrium iron garnet crystal.

6. A current measurement apparatus according to
Claim 1, wherein:

the magneto-optical device is made of a
10 substance that produces magneto-optical polar Kerr
effect.

7. A current measurement apparatus according to
Claim 1, wherein:

the magneto-optical device is made of a
15 substance that produces Faraday effect.

8. A current measurement apparatus according to
Claim 1, wherein:

the electric circuit is a circuit which is a
load of small impedance; and

20 the current is a high frequency current.

9. A current measurement apparatus according to
Claim 1, wherein:

a marker is formed on the electric circuit in
parallel with a transmission line.

25 10. A current measurement apparatus for measuring
current that flows in transmission lines of an electric
circuit provided with a first transmission line to be
an approach route of the flow of the current and a

second transmission line to be a return route of the flow of the current, comprising:

a light source for radiating polarized light;

5 a magneto-optical device which is arranged in a magnetic field generated based upon current that flows in the first transmission line and a magnetic field generated based upon current that flows in the second transmission line, applies the variation of polarization proportional to magnetization induced by
10 the magnetic field to the polarized light when the polarized light radiated from the light source is incident and reflects the polarized light; and

means for converting the variation of polarization included in polarized light reflected on
15 the magneto-optical device to an electric signal and measuring current, wherein:

the polarized light is incident on the magneto-optical device and between the first transmission line and the second transmission line.

20 11. A current measurement apparatus according to Claim 10, further comprising:

a magnetic field generator for applying a magnetic field to the magneto-optical device.

12. A current measurement apparatus according to
25 Claim 10, wherein:

the direction of the magnetization in an incident position of the polarized light and a direction in which the polarized light travels are

parallel.

13. A current measurement apparatus according to Claim 10, wherein:

5 the light source is a pulse laser; and
the pulse laser is oscillated in
synchronization with measured current.

14. A current measurement apparatus according to Claim 10, wherein:

10 the magneto-optical device is made of a bismuth
substituted yttrium iron garnet crystal.

15. A current measurement apparatus according to Claim 10, wherein:

15 the magneto-optical device is made of a
substance that produces magneto-optical polar Kerr
effect.

16. A current measurement apparatus according to Claim 10, wherein:

the magneto-optical device is made of a
substance that produces Faraday effect.

20 17. A current measurement apparatus according to Claim 13, wherein:

the magneto-optical device is provided with a
reflecting film.

25 18. A current measurement apparatus according to Claim 10, wherein:

the electric circuit is a circuit which is a
load of small impedance; and

the current is high frequency current.

19. A current measurement apparatus according to Claim 10, wherein:

5 a marker is formed on the electric circuit at the middle of a first transmission line and a second transmission line or in parallel with a transmission line.